

# Energy Transformations

7.1-C14

Name: \_\_\_\_\_



## Getting the Idea

Energy is involved every time you move, think, eat, or even sleep. Energy keeps cars running, makes the sun shine, and causes Earth to turn on its axis. There are many different kinds of energy. Each kind can be changed into other kinds.

Both potential and kinetic energy can take many different forms, such as light, heat, motion, and sound. Look at the table below:

Forms of Energy

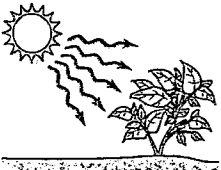
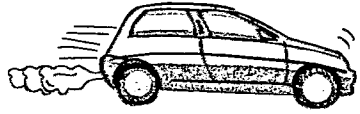
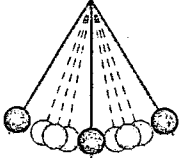
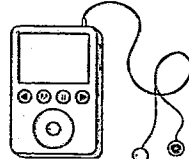
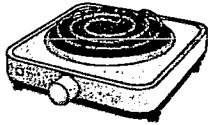
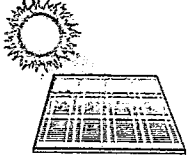
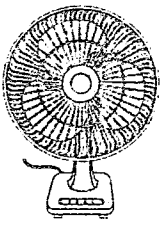

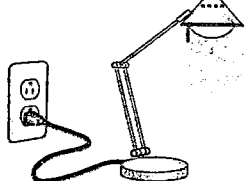
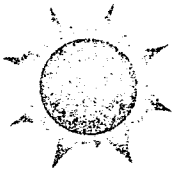
Potential: Stored Energy	Kinetic: Energy of Motion
<b>Chemical energy:</b> energy stored in the bonds that hold atoms together as molecules (examples: foods, fuels)	<b>Electrical energy:</b> energy of moving electrical charges (examples: lightning, electrical charge moving through wire)
<b>Nuclear energy:</b> energy stored in the nuclei of atoms; released when nuclei join together or split apart (examples: nuclear power plants, fusion in the sun)	<b>Radiant energy:</b> energy that travels as electromagnetic waves (examples: visible light, microwaves, X-rays, infrared rays)
<b>Gravitational energy:</b> energy of position (examples: roller coaster car at top of hill, pendulum)	<b>Sound energy:</b> energy given off by vibrating objects; energy we can hear (examples: voices, music)
<b>Stored mechanical energy:</b> energy stored in an object because a force was applied to it (examples: compressed spring, stretched rubber band)	<b>Mechanical energy:</b> energy of motion used to do work (examples: flowing water, wind, your body when you move, machines)
	<b>Thermal energy:</b> energy of the moving particles that make up matter (examples: energy that maintains your body's temperature, geothermal energy)

### Words

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## Lesson 17: Energy Transformations

Energy can be changed, or transformed, from one form to another. These energy transformations happen all around you. They also happen inside you. The chart below shows some examples.

Some Energy Transformations	
<p>Green plants change radiant energy (light) to chemical energy.</p> 	<p>Burning fuels changes chemical energy into mechanical energy.</p> 
<p>The swing of a pendulum changes gravitational energy into mechanical energy.</p> 	<p>A digital music player changes chemical energy (inside the battery) to sound energy.</p> 
<p>A hot plate changes electrical energy to thermal energy.</p> 	<p>Solar panels change radiant energy to electrical energy.</p> 
<p>A fan changes electrical energy into mechanical energy.</p> 	<p>Your body changes chemical energy into mechanical and thermal energy.</p> 
<p>A lightbulb changes electrical energy to light energy.</p> 	<p>The sun and other stars change nuclear energy into radiant energy.</p> 

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## **Transformations of Potential Energy into Mechanical Energy**

As you learned in Lesson 16, potential energy is stored energy. Different forms of potential energy can be changed into mechanical energy.

You have learned that gravitational potential energy can make objects move. This form of energy causes a roller coaster car to move up and down hills. This energy makes objects fall or swing back and forth.

Chemical energy can make things move, too. When a car engine burns gasoline, the chemical energy stored in the fuel is changed into thermal energy, or heat. Heat makes parts of the engine move. Then those engine parts make the car move. Chemical energy stored in batteries can make a toy or a toothbrush move.

## **Energy Transformations in Your Body**

When you eat food, you take in chemical energy. Some of that energy is changed into mechanical energy to move your muscles. Some is changed into electrical energy. Your nervous system sends electrical signals throughout your body.

When you talk or sing, some chemical energy is changed into mechanical energy and then into sound energy. And some chemical energy is transformed into thermal energy. That keeps your body at the right temperature. Your body stores extra energy in its tissues for use later.

## **Transformations of Electrical Energy**

Many of the devices you use transform electrical energy into other forms of energy. When you turn on a lamp, the lamp wire carries electrical energy to the lightbulb. Inside the bulb, the electrical energy moves through a thin wire called a filament. The filament gets so hot that it glows. The filament changes electrical energy into light and heat.

A hair dryer changes electrical energy into heat and mechanical energy. Computers transform electrical energy into light energy (on monitors), sound energy (from speakers), and mechanical energy (in printers and other moving parts).

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## Conservation of Energy

In any energy transformation, some energy changes to heat. Often the heat is not useful, but it is not lost energy. Energy can be changed from one form to another, but it can never be created or destroyed. This scientific principle is called the *law of conservation of energy*.

### DISCUSSION QUESTION

Describe two examples of energy transformations. In what form was the energy before each transformation? What was the form of the energy after the transformation?

### LESSON REVIEW

1. Which one is NOT a form of potential energy?
  - A. gravitational energy
  - B. chemical energy
  - C. light energy
  - D. nuclear energy
  
2. Which one changes chemical energy into mechanical energy?
  - A. blender
  - B. flashlight
  - C. ceiling fan
  - D. human body
  
3. An example of chemical energy being transformed into light energy is
  - A. a candle burning.
  - B. a lightbulb shining.
  - C. a traffic light turning red.
  - D. a television screen lighting up.

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4. When the strings of an acoustic guitar are plucked, they vibrate. These vibrations are transferred to particles in the air. What kind of energy is produced by these vibrating particles?
- A. chemical energy
  - B. nuclear energy
  - C. electrical energy
  - D. sound energy